

Accordingly, a response to the Office Action is due no later than January 28, 2003; thus, this Amendment is being timely filed. Applicant respectfully requests amendment of the above referenced application as follows:

**IN THE CLAIMS:**

Please substitute amended claims 40, 43, 44, 47, 48, 50, 51, 53, and 56 as provided below, for claims 40, 43, 44, 47, 48, 50, 51, 53, and 56 currently in the present application.

Please cancel claim 49 in the present application without prejudice or disclaimer.

C1  
40. (Twice Amended) A catalyst having activity under an irradiation of visible light in a wavelength region from about 400 to 600 nm, comprising titanium dioxide having stable oxygen defects and exhibiting NO<sub>x</sub> oxidation activity under the irradiation of a visible light at least in the wavelength region of from about 400 to 600 nm; and said titanium dioxide further having a peak area ratio (O1s/Ti2p) of a peak area obtained by X-ray photoelectron spectroscopy assigned to the 1s electrons of oxygen (O1s) participating in the bonds with titanium to a peak area obtained by X-ray photoelectron spectroscopy assigned to the 2p electrons of titanium (Ti2p) of 1.99 or lower.

SUB D1  
C2  
43. (Twice Amended) The catalyst according to Claim 40, comprising titanium dioxide that is characterized by an X-ray diffraction (XRD) pattern that is substantially free from patterns other than patterns assigned to anatase type titanium dioxide.

SUB D1  
44. (Twice Amended) A catalyst having activity under an irradiation of visible light, said catalyst comprising titanium dioxide having stable oxygen defects and a peak

January 28, 2003

C2  
at  
SUBO1  
area ratio (O1s/Ti2p) of a peak area obtained by X-ray photoelectron spectroscopy assigned to the 1s electrons of oxygen (O1s) participating in the bonds with titanium to a peak area obtained by X-ray photoelectron spectroscopy assigned to the 2p electrons of titanium (Ti2p) of 1.99 or lower.

C3  
47. (Twice Amended) A catalyst having activity under an irradiation of visible light, the catalyst comprising titanium dioxide having stable oxygen defects and yielding a signal having a g value of from 2.003 to 2.004 in an ESR measured in darkness at 77K under vacuum, and the catalyst also yielding a signal higher in intensity when measured at least under the irradiation of light in the wavelength region of from 420 to 600 nm at 77K in vacuum.

48. (Amended) The catalyst according to Claim 47, wherein a signal assigned to  $Ti^{3+}$ , said signal yielding a g value of 1.96 when measured by ESR in darkness at 77K in vacuum, is substantially not observed on said catalyst.

C4  
SUBO1  
50. (Twice Amended) A method for producing a catalyst comprising titanium dioxide having stable oxygen defects and a ratio of a peak area obtained by X-ray photoelectron spectroscopy assigned to the 1s electrons of oxygen participating in the bonds with titanium to a peak area obtained by X-ray photoelectron spectroscopy assigned to the 2p electrons of titanium (O1s/Ti2p) of 1.99 or lower and having activity under an irradiation of a visible light, said method comprising treating the titanium dioxide with hydrogen plasma, characterized by performing said treatment in a state substantially free from an intrusion of air into a treatment system.

January 28, 2003

51. (Twice Amended) The method for producing a catalyst according to claim 50, wherein said treatment is performed in a tightly sealed system and said state substantially free from the intrusion of air into the treatment system is a state in which a vacuum degree inside the tightly sealed system takes at least 10 minutes to make a change of 1 Torr.

53. (Twice Amended) A method for producing a catalyst comprising titanium dioxide having stable oxygen defects and a ratio of a peak area obtained by X-ray photoelectron spectroscopy assigned to the 1s electrons of oxygen participating in the bonds with titanium to a peak area obtained by X-ray photoelectron spectroscopy assigned to the 2p electrons of titanium (O1s/Ti2p) of 1.99 or lower and having activity under an irradiation of a visible light, said method comprising treating the titanium dioxide with a plasma of rare gas, and performing said treatment in a state substantially free from an intrusion of air into a treatment system.

56. (Twice Amended) A method for producing a catalyst comprising titanium dioxide having stable oxygen defects and a ratio of a peak area obtained by X-ray photoelectron spectroscopy assigned to the 1s electrons of oxygen participating in the bonds with titanium to a peak area obtained by X-ray photoelectron spectroscopy assigned to the 2p electrons of titanium (O1s/Ti2p) of 1.99 or lower and having activity under an irradiation of visible light, comprising the step of introducing ions of a rare gas on at least a portion of the surface of the titanium dioxide by means of ion implantation.